What is claimed is:

1. A system for transferring fluid between a vessel and a microfluidic device, the system comprising:

a vessel capable of holding a fluid, the vessel having at least one substantially nonplanar wall defining a first aperture therein; and

a microfluidic device having a first port;

wherein the microfluidic device is adaptably attached to the vessel by co-locating the first port with the first aperture such that fluid can flow between the vessel and the microfluidic device through the co-located first aperture and first port.

2. The system of claim 1 wherein the microfluidic device is flexible.

3. The system of claim 1 wherein the microfluidic device is made with sandwiched stencils.

4. The system of claim 3 wherein at least one stencil is made of a polymeric material.

5. The system of claim 3 wherein the microfluidic device includes multiple layers, and at least one layer is a self-adhesive tape.

6. The system of claim 5 wherein at least one layer of self-adhesive tape is self-adhesive on both sides.

7. The system of claim 5 wherein the microfluidic device adaptably attaches to the vessel with self-adhesive tape.

8. The system of claim 1 wherein following attachment the microfluidic device may be removed substantially intact from the vessel.

9. The system of claim 1 wherein fluid flows from the vessel into the microfluidic device.

10. The system of claim 1 wherein fluid flows from the microfluidic device into the vessel.

11. The system of claim 1 wherein the vessel contains a continuous flow of fluid.

12. The system of claim 1 wherein the microfluidic device has a vent.

13. The system of claim 12 wherein the vent is an air-permeable membrane that inhibits the passage of liquid.

14. The system of claim 1 wherein the microfluidic device has a second port such that fluid can flow within the microfluidic device from the first port to the second port.

15. The system of claim 14, wherein a second aperture is defined in a wall of the vessel, and the second port is co-located with the second aperture such that fluid can flow between the vessel and the microfluidic device through the co-located second port and second aperture.

16. The system of claim 1 wherein the vessel is selected from the group consisting of: a pipe, a tube, a vial, and a syringe.

17. The system of claim 1 wherein the vessel is cylindrical and includes a moveable piston sealingly engaged therein.

18. The system of claim 1 wherein the microfluidic device comprises a stencil continuously wrapped around the vessel.

19. The system of claim 18 wherein the continuously wrapped stencil is self-adhesive.

20. The system of claim 18 wherein at least a portion of the vessel is cylindrical in shape.

21. The system of claim 18 wherein the vessel is a syringe.

22. The system of claim 1 wherein the microfluidic device is a rewindable flexible device.

23. The system of claim 22 wherein the microfluidic device is composed of sandwiched stencils.

24. The system of claim 23 wherein the device includes an internal cover layer and an external cover layer.

25. The system of claim 22 wherein the vessel has a circumference, the microfluidic device has a length, and the unwound length of the microfluidic device exceeds the circumference of the vessel.

26. The device of claim 1 wherein the microfluidic device is used to detect the presence of at least one chemical or biological material in the fluid.

27. The device of claim 1 wherein the microfluidic device is used to sense at least one physical property of the fluid.

28. The device of claim 27 wherein the at least one physical property is selected from the group consisting of: temperature, pressure, differential pressure, and flow.

29. The device of claim 11 wherein the vessel and the fluid are utilized in a bioreactor.

30. A method for transferring fluid between a vessel and a microfluidic device, the method comprising the steps of:

providing a vessel capable of holding fluid, the vessel having at least one substantially nonplanar wall defining a first aperture therein;

providing a microfluidic device having a first port and being adapted to contour to the vessel adjacent to the first aperture;

attaching the microfluidic device to the vessel such that the first port is co-located

with the first aperture; and

causing fluid to flow between the vessel and the microfluidic device.

31. The method of claim 30 wherein fluid is caused to flow between the vessel and the microfluidic device by generating a pressure gradient between the vessel and the microfluidic device.

32. The method of claim 30, wherein the microfluidic device is flexible.

33. The method of claim 30 wherein the microfluidic device attaches to the vessel with an adhesive.

34. The method of claim 30 wherein the microfluidic device comprises a self-adhesive tape and wherein the microfluidic device attaches to the vessel with the self-adhesive tape.

35. The method of claim 30 wherein the microfluidic device is made with sandwiched stencils.

36. The method of claim 30 further comprising the step of venting any initial contents of the microfluidic device.

37. The method of claim 30 further comprising the step of removing the microfluidic device substantially intact from the vessel.

38. The method of claim 30 wherein fluid flows through the microfluidic device and at least a portion of the fluid is returned to the vessel.

39. The method of claim 30 wherein the microfluidic device has a second port such that fluid can flow within the microfluidic device from the first port to the second port.

40. The method of claim 39, wherein a second aperture is defined in a wall of the vessel and the microfluidic device has a second port, the second aperture being co-located with the second port such that fluid can flow between the vessel and the

microfluidic device through the co-located second aperture and second port.

41. The method of claim 30 wherein the vessel contains a continuous flow of fluid.

42. The method of claim 30 wherein the vessel is selected from the group consisting of: a pipe, a tube, a vial, and a syringe.

43. The method of claim 31 wherein the vessel is cylindrical and includes a moveable piston sealingly engaged therein.

44. A fluid sampling device comprising:

a cylindrical vessel capable of holding fluid, the vessel having a characteristic length and an interior wall that defines a first and a second radial aperture displaced from one another along the length of the vessel;

a first moveable plunger sealingly engaged to the interior wall of the vessel;

a second moveable plunger sealingly engaged to the interior wall of the vessel; and

a reservoir having an inlet port in fluid communication with the first aperture and having an outlet port in fluid communication with the second aperture;

wherein fluid is transferred from the vessel into the reservoir as the first and second plungers are translated outward from the vessel.

45.. The device of claim 44, wherein the reservoir is a microfluidic reservoir.

46. The device of claim 45, wherein the microfluidic reservoir includes a microfluidic channel.

47. The device of claim 45, wherein the microfluidic reservoir is external to the vessel.

48. The device of claim 45, wherein the microfluidic reservoir is attached to the vessel.

49. The device of claim 44 wherein the first plunger and the second plunger are connected by a mechanical linkage.

50. The device of claim 48 wherein the mechanical linkage has a deadband.

51. The device of claim 44 wherein the first plunger and the second plunger are not physically connected.

52. The device of claim 44 wherein the vessel is a syringe.

53. A wrappable microfluidic device comprising:
a first flexible layer defining at least one microfluidic channel therein; and
a first port for communicating fluid with the at least one microfluidic channel;
wherein at least a portion of the first layer may be wrapped around itself to form a roll.

54. The device of claim 53 further comprising adhesive to form a continuously wrapped device

55. The device of claim 54 wherein the adhesive is integral to the first layer as an adhesive tape.

56. The device of claim 53 further comprising a flexible internal cover layer and a flexible external cover layer sandwiching the first layer.

57. The device of claim 56 wherein the device is rewindable.

58. The device of claim 53 wherein the first port is external to the roll.

59. The device of claim 53 wherein the device is used for electrophoretic separation.